Applicant's Response to Examiner's 35 USC § 103(a) Rejection

Examiner Rejection

Claims 1 – 13, 15-20, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stover in view of Haase '435.

Applicant's Response

Applicant appreciates the time afforded by the Examiner to formulate his rejection.

Applicant respectfully presents to the Examiner that Haase '435 cannot be a cited reference against the instant application; as: 1) Haase '435 is a result of the same parent application (08/721,557) as that for the instant invention (09/055,870); 2) both have the same inventor, e.g. Richard Alan Haase; 3) the instant application filed (09/055,870) is a continuation-in-part of Haase '435 (08/721,557); while 3) Haase '435 was not available to one of ordinary skill in the art at the time of filing for the instant invention. Applicant presents from the cover page for Haase '435:

United States Patent [19] [11] **Patent Number: 5,846,435**
Haase [45] **Date of Patent: Dec. 8, 1998**

[54] **METHOD FOR DEWATERING OF SLUDGE**

[76] Inventor: **Richard Alan Haase**, P.O. Box 623, Sugar Land, Tex. 77487-0623

[21] Appl. No.: **721,557**

[22] Filed: **Sep. 26, 1996**

Applicant presents from the cover page of the instant invention in re-issue:

United States Patent [19] [11] **Patent Number: 5,906,750**
Haase [45] **Date of Patent: May 25, 1999**

[54] **METHOD FOR DEWATERING OF SLUDGE**

[76] Inventor: **Richard Alan Haase**, P.O. Box 623, Sugar Land, Tex. 77487-0623

[21] Appl. No.: **09/055,870**

[22] Filed: **Apr. 6, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/721,557, Sep. 26, 1996, Pat. No. 5,846,435.

Applicant respectfully presents according to 35 U.S.C. 102:

A person shall be entitled to a patent unless — , and by paragraph:

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or , while

Neither the instant invention nor Haase was known. Haase '435 issued and published on 12/10/98, which is a full 8 months after the instant application for patent 04/06/98; therefore, Haase '435 was NOT "known or used by others, or patented or described in a printed publication in this or a foreign country, before the invention thereof by application for patent".

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or , while

Neither the instant invention nor Haase '435 was "patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States"; as, there is no evidence of such.

(c) he has abandoned the invention, or , while

Neither the instant invention nor Haase '435 went abandoned.

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than

for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or , while

There has been NO foreign country filing of either Haase '435 or the instant invention to be "first patented or caused to be patented, or [ ] the subject matter of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States"; as, there is no evidence of such.

(e) the invention was described in — (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language; or , while

Neither was Haase '435 nor the instant invention "described in – (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English Language"; as, there is no evidence of such.

(f) he did not himself invent the subject matter sought to be patented, or , while

Applicant is the inventor of record for both Haase '435 and the instant application, as evidenced.

> (g)(1) during the course of an interference conducted under section 135 or section 291, another inventor involved therein establishes, to the extent permitted in section 104, that before such person's invention thereof the invention was made by such other inventor and not abandoned, suppressed, or concealed, or (2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. In determining priority of invention under this subsection, there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other. , while

There is no interference proceeding in relation to either Haase '435 or the instant application.

Therefore, Haase '435 cannot be cited against the instant application in a 35 U.S.C. § 103 rejection.

In addition, Applicant respectfully presents to the Examiner in addition to Applicant's Teaching Away Argument that Dentel 1995 on page 2, first paragraph, states:

> "The **means by which chemical conditioners interact with the colloidal phase in biological suspensions to facilitate the release of water is poorly understood**, with the optimal amounts and types of conditioners required depending on a variety of factors. These include both **aqueous and surface chemistries of the sludge**, and the **physical properties of the suspended solids, which are determined by characteristics of the original wastewater and by the operational parameters for the various treatment processes employed with the plant**. Also important is **the chemistry of any chemical conditioner used, and how it interacts with the biosolids**." **(Emphasis added)**

And, Chitikela 1996 states on page 11-25,

> "The optimal chemical conditioning and dewatering of a municipal sludge is a challenging task. **The means by which chemical conditioners interact with the colloidal phase in biological suspensions to facilitate the release of water is poorly understood**, with the optimal amounts and types of conditioners required depending on variety of factors. These include both **aqueous and surface chemistries of the sludge**, and the **physical properties of the suspended solids**. Also **important is the chemistry of any chemical conditioner used, and how it interacts with the biosolids**."

The above statements and teachings from June 1995 and August 1996 are while the parent application for the instant claims, e.g. 08/721,557, was filed on 09/26/96 and the instant application for patent was filed on 04/06/98. Therefore, at the time of the instant patent application, "means by which chemical conditioners interact with the colloidal phase in biological suspensions to facilitate the release of water [was] poorly understood". This is while at the time of the instant patent application, Dentel 1995 and Chitikela 1996 demonstrate that "the optimal amounts and types of conditioners required depending on a variety of factors": 1) "aqueous and surface chemistries of the sludge", 2) "physical properties of the suspended solids, which are determined by characteristics of the original wastewater and by the operational parameters for the various treatment processes employed with the plant", and 3) "the chemistry of any chemical conditioner used, and how it interacts with the Biosolids".

These teachings at the time of the instant patent application are while Stover does not teach a "method for dewatering thermophilic biological sludge" comprising any of the factors. This is while the instant invention teaches for the dewatering of a thermophilic biological sludge, 1) "aqueous and surface chemistries of the sludge" in column 2:

> Despite the disadvantages of mesophyllic bacteria, mesophyllic bacteria are preferable in relation to the dewatering of digested sludge. Mesophyllic bacteria naturally secrete a polysaccharide which acts as a tackifier providing a chemical mechanism of floc formation. This chemical mechanism is an aid to traditional cationic polyacrylamides to begin the dewatering process. However, thermophilic bacteria do not secrete a tackifying polysaccharide. Furthermore, thermophilic bacteria naturally repel each other. This repelling nature of thermophilic bacteria makes the dewatering of sludge from the thermophilic digestion process expensive and difficult.

The instant invention also teaches, 2) "physical properties of the suspended solids, which are determined by characteristics of the original wastewater and by the operational parameters for the various treatment processes employed with the plant" in column 2:

> medium of microbial growth. At temperatures of at least about 115° F., active bacteria are of the thermophilic variety. Aerobic and/or anaerobic thermophilic microorganisms are used to carry out any required degradation in a thermophilic, exothermic process. The thermophilic digestion system relies on high operating temperatures (greater than about 55° C. or 131° F.) to achieve a substantial pathogen destruction. While a fraction of the energy released from the thermophilic process is stored intracellularly to form new cells, a

> larger fraction of the energy is released as heat into the environment. The released heat is the major heat source used to achieve the desired operating temperature. Experiments have shown that between about 8,500 and 13,000 BTU are released with the thermophilic digestion of one pound of volatile solids (bacteria). By maintaining a sufficient temperature for a required period of time, pathogenic organisms are reduced to below detectable levels.

The instant invention teaches, 3) "the chemistry of any chemical conditioner used, and how it interacts with the biosolids" in column 4:

> The present invention relates to the dewatering of sludge from biological treatment systems of wastewater treatment facilities. Specifically, this invention is directed toward the removal of water from sludge that has been digested by a thermophilic digestion process. A chemical method is presented for the dewatering of biological sludge using polyquaternary amine, aluminum sulfate, ferric chloride and blends thereof as the primary component.

And, in columns 8 and 9:

> In method five as well, the polymeric quaternary ammonium compounds are from DADMAC family or from epi-DMA family. In a preferred embodiment, the polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof are added directly to the sludge and, upon formation of microflocs of the sludge from the polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof, a cationic polyacrylamide is added to form a floc that dewaters the sludge. Preferably, ratios of the polymeric quaternary ammonium compounds with respect to aluminum sulfate range from about 1:16 to about 1:2 by weight. Ratios of the polymeric quaternary ammonium compounds with respect to ferric chloride range from about 1:8 to about 1:10 by weight. Ratios of the polyacrylamide with respect to aluminum sulfate range from about 1:80 to about 1:8 by weight. Ratios of the polyacrylamide with respect to ferric chloride range from about 1:70 to about 1:7 by weight.
>
> Method five also involves a polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge of between about 50 ppm:1 percent and about 300 ppm:1 percent. The polymeric quaternary ammonium compound, aluminum sulfate, ferric chloride and blends thereof are added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system, and an anionic polyacrylamide is then

> added for final floc formation. In a preferred embodiment, the polymeric quaternary ammonium compound and the anionic polyacrylamide are in an approximately 1:8 to 20:1 ratio by weight. In a preferred embodiment, polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 5000 ppm:1 percent.
>
> Method five can also be used to treat a mixture of biological sludge with primary sludge. In addition, the polymeric quaternary ammonium compounds, aluminum sulfate, ferric chloride and blends thereof, as well as polyacrylamide, can be used in solution, in emulsion or in dry form.

Therefore, at the time of the instant patent application "means by which chemical conditioners interact with the colloidal phase in biological suspensions to facilitate the release of water was poorly understood"; while, it was known at the time of the instant patent application that three teachings were needed to understand said means, all of which are taught by Applicant. Specifically, Applicant in the instant invention teaches:

1. "Aqueous and surface chemistries of the sludge",
2. "Physical properties of the suspended solids, which are determined by characteristics of the original wastewater and by the operational parameters for the various treatment processes employed with the plant", and
3. "The chemistry of any chemical conditioner used, and how it interacts with the biosolids".

Therefore, Applicant discovered "the source of the problem" and taught "the source of the problem" and a solution to "the source of the problem" in the instant invention. This is while "the source of the problem" to dewater thermophilic biosolids was not taught or suggested by others, as was required in the art.

The above is while Dentel 1995 further states on page 2 that:

"**The success of any conditioning process will also depend on the specific dewatering process employed**.

Thus, the conditioning process is **a multivariate problem with no simple strategy available for optimization**. At present, the required dosages for chemical conditioners must be determined empirically. With this being the case, **the use of**

multiple chemical additives becomes less feasible because of the difficulty in identifying a proper dosage combination." **(Emphasis added)**

And, Chitikela 1996 further states that,

"The success of any conditioning process will also depend on the specific dewatering process employed. Thus, the sludge conditioning process is **a multivariate problem with no simple strategy available for its optimization**. At present, the required dosages for chemical conditioners must be determined empirically. With this being the case, the use of multiple chemical additives become less feasible because of the difficulty in identifying a proper dose combination."

Therefore, the instant claims could not have been obvious at the time of filing for the instant patent application; as while both Dentel 1995 and Chitikela 1996 taught away,

1. There is no previous teaching or suggestion to that of Applicant for the three required teachings in the dewatering of a thermophilic biological sludge; and
2. At the time of the instant patent application, it was "less feasible" to develop the instant claims due to the "difficulty" of a "multivariate problem". This teaching is presented for a traditional mesophilic biological sludge; therefore, the difficulty is enhanced and the feasibility is reduced with the further complication of a thermophilic biological sludge (undue experimentation to develop the instant claims).

In furtherance to the above argument and that the prior art does not "identify the source of the problem", which is a "difficult" and "multivariate" "problem", Applicant refers the Examiner to a timely publication from the US EPA, a pre-eminent authority in wastewater treatment and in dewatering (this citation provided by Applicant in OAR dated 12/27/07). Specifically, the US EPA document TBS Prakasam, et al. *Effect of Recycling Thermophilic Sludge on the Activated Sludge Process,* EPA Project Summary 5, Sept. 1990 states under the heading of Dewaterability:

"Capillary suction time (CST) measurements at various polymer dosages indicated that mesophilic sludge required a lower polymer dosage than did the thermophilic sludge (10 vs. 22.5 kg/dry tonne) to achieve the minimum CST that was possible. The thermophilic sludge, however, exhibited highest floc strength than did the messophilic sludge.

Pilot scale centrifuge studies confirmed that the thermophilic sludge required a higher polymer dosage than did the messophilic sludge. At optimal polymer dosages, those studies also indicated that the mesophilic sludge approached 100% solids capture whereas the thermophilic

> solids approached a maximum of 96% solids capture. The lower solids capture with thermophilic sludge probably resulted from the higher concentration of fine particles in it than in the messophilic sludge."

In contrast and in solution to the US EPA cited challenge, Applicant refers the Examiner to Example 9 of the instant specification, which is located in col. 11 lines 10 to 33.

In addition, the US EPA report goes on to recommend that:

> "Based on the lack of effect on sludge mass end the increase in digestion capability required, the Torpsy process is not recommended for Chicago's conventional rate activated sludge plants. Nor is thermophilic digestion as the terminal sludge digestion process recommended if the sludge is to be used at a site with nearby neighbors."

Therefore, the US EPA, **a pre-eminent authority,** e.g. one of expert skill in the art and of much greater skill than one of ordinary skill in the art, was not able to practice the instant claims from available teachings.

Non-Obviousness

Applicant has respectfully presented relevant facts which demonstrate that the hypothetical person having ordinary skill in the art would not have found the invention as a whole obvious at the time of the instant patent application. Specifically, Applicant has respectfully demonstrated to the Examiner:

1. **The scope and content of the prior art** - Notable references taught away from the instant claims at the time of the instant patent application, while teaching that the instant claims would require undue experimentation. This is while notable references teach knowledge of three factors as important to understand the dewatering of bio-solids. No reference teaches the three factors in the dewatering of thermophilic bio-solids; this is while, the instant patent does.
2. **The differences between the prior art and the claims at issue** - The prior art of record does not teach the "source of the problem" or "a method to dewater thermophilic biosolids". This is while, the prior art of record establishes three required teachings in relation to the dewatering of biosolids; after which, Applicant is the first to have met the three required teachings within the instant invention and as claimed within the instant claims.

3. **The level of ordinary skill in the pertinent art** – At the time of the instant patent application and relating to those of ordinary skill in the art, a pre-eminent authority, one of expert skill in the art - the US EPA, taught away from the instant claims. Therefore, the instant claims could not have been obvious to the hypothetical person having only ordinary skill in the art at the time of the instant patent application.

Applicant Requests Claim Allowance

Applicant has respectfully traversed all of the Examiner's rejections. Applicant herein respectfully requests an allowance of claims 1 – 13, 15 – 20 and 39 as presented herein.

CONCLUSION

Applicant respectfully requests entry of this RCE and OAR, along with favorable reconsideration of the pending claims. Applicant has respectfully provided to the Examiner numerous facts and argument which support allowance of the presented claims. Specifically, Applicant has respectfully provided to the Examiner relevant facts and argument relating to:

1. Teaching away by notable published references at the time of the instant patent application,
2. Applicant discovery and teaching of the source of the problem, as evidenced in the instant application and required by notable published references at the time of the instant patent application; while,
3. Examiner Citations do not teach the source of the problem.
4. Hindsight reconstruction in use of the Citations when taken in context with notable publications at the time of the instant patent application,
5. A different purpose for many of the Citations as compared to the instant claims,
6. The instant patent is a continuation-in-part of a cited reference, e.g. Haase '435,
7. Haase '435 did not publish prior to the instant patent application, and
8. Copying and commercial success by others, as evidenced in secondary considerations.

Applicant believes this amendment to place the presented claims in condition for allowance. Applicant requests that this OAR be entered; and after due consideration of the facts presented herein, the presented claims be allowed and a certificate be issued.

To facilitate the resolution of any issues or questions presented by this paper, Applicant respectfully requests that the Examiner directly contact the undersigned by phone to further discussion, reconsideration and allowance of the claims.

Respectfully submitted,

Richard A. Haase, Pro Se' Applicant

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